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Crustacea Decapoda of the Inlé Lake Basin.

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CRUSTACEA DECAPODA OF THE INLE LAKE BASIN.

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Plates XXIV, XXV.

The collection of Decapod Crustacea made by Dr. Amundale and Dr. F. H. Gravely in and near the Inlé Lake in the Southern Shan States comprises representatives of the following seven species :—

POTAMONIDÆ.

Potamon (Potamon) brownianum, sp. nov.

Potamon (Potamon) acanthicum, sp. nov.

Potamon (Potamon) curtobates, sp. nov.

PALÆMONIDÆ.

Palæmon naso, sp. nov.

Palæmon hendersoni, de Man.

ATYIDÆ.

Caridina amundalei, sp. nov.

Caridina ueberi, prox. var. *sumatrensis*, de Man.

That five of these species should prove to be undescribed is remarkable, and particularly that three of the new forms should be Potamonidae, for the Indian species of this family have been described by Alcock from a great abundance of material, including the late Dr. John Anderson's collection from Upper Burma.

The general results derived from an examination of the Decapod fauna of the district agree with those obtained in other groups, especially the Fishes and the Mollusca :—the fauna is in a large measure endemic and, in consideration of the past history of the region (see the introduction to this volume, p. 6), must be regarded as including a large proportion of peculiar species some of which once spread over a much greater area. Like other groups of aquatic animals the Decapods of the district appear for the most part to be specialized rather than primitive.

Of the two prawns hitherto known, *Palæmon hendersoni* has a range extending from the Darjiling district along the Eastern Himalayas to Burma ; it is also abundant in the hills of Assam, south of the Brahmaputra. The Burmese specimens differ slightly from those found in the Himalayan regions and in Assam and possibly represent a distinct race. De Man's *Caridina ueberi*, described from Flores, Celebes and Saleyer is represented in the Shan States by a form similar in some respects to the var. *sumatrensis* from the east coast of Sumatra, but in all probability subspecifically distinct. Races of this species, some of which undoubtedly deserve nominal recognition, occur over the whole of the Indian Empire but until it has been possible to make a detailed study

of material from many different localities, it seems best to postpone further consideration of the point.

The affinities of the undescribed species are with Burmese and Assamese forms. To this there is, however, one exception, *viz.*, *Palaeomon naso*, a species which perhaps differs from the others in being primitive. The relationships of this prawn are by no means clear; the unusually weak development of the second legs suggests alliance with such forms as *P. lamarrei*, Milne-Edwards, and *P. lanchesteri*, de Man, both of which are found in coastal districts.

Caridina amandalei seems to be the representative in the Salween watershed of a curious little group of species in which the number of epipods is diminished. The only other two species of this group at present known inhabit streams at the base of the Eastern Himalayas.

Of the Potamonidae *P. browneanum* is allied to *P. andersonianum* (Wood-Mason), a species of wide distribution in the mountains of Burma and Yunnan. *P. curtobates* is related to *P. pealium* (Wood-Mason), hitherto known only from N. E. Assam and from the Kakhyen Hills on the frontiers of Burma and China.

Potamon acanthicum is a very remarkable form, quite unlike any other Burmese species. It appears, however, to be a highly specialized offshoot of the same stock as *P. andersonianum*. The species is interesting in its approximation to the subgenus *Acanthotelphusa*.

According to the observations made by Dr. Amundale Decapod Crustacea are of greater economic importance in the Shan States than in most inland parts of India. All the species mentioned in this paper are used as food. In the State of Yawngwhe, in which the Inlé Lake is situated, the Potamonidae are caught by the hill tribes and brought down into the village bazaars, in which *Palaeomon naso* is sometimes also on sale. The former are sold roasted, the latter raw and often alive. The Atyidae, however, in spite of their small size, are of greater consequence, for very large quantities are collected both for local consumption and for export to other parts of Burma and even, it is said, to Siam. They are captured, chiefly as the water sinks in autumn, in small traps of basket-work and in flat baskets inserted under floating vegetation; dried in the sun on bamboo mats and packed in large deep baskets, each of which is two men's load. They are carried by porters over the He-Ho pass to the railway and on pack mules inland to the Siamese frontier. One of the baskets used in their capture is figured on Plate vii, fig. 1 of this volume, while one of those in which they are stored and transported is shown in the photograph reproduced as fig. 3, pl. xliii, in vol. V of the Memoirs of the Asiatic Society of Bengal.

Family POTAMONIDAE.

Potamon (Potamon) browneanum, sp. nov.

Plate xxiv, figs. 1, 2.

This species is closely allied to *Potamon (P.) andersonianum* (Wood-Mason), but differs from it and from all its varieties in a number of well-marked features.

The length of the carapace is about four-fifths its greatest breadth, its outline in dorsal view being much the same as in *P. andersonianum*; it is, however, much deeper, the depth being almost or quite three-fifths of the length. The greater depth is, in the main, due to the fact that the upper surface between the epigastric crests and the posterior margin is decidedly convex, whereas it is quite flat in typical *P. andersonianum* and almost flat in the var. *rangoonense* of that species (pl. xxiv, figs. 1, 2).

The areolation of the upper surface is faint. The mesogastric areola is defined anteriorly by the bifurcation of the frontal groove and posteriorly by the cervical groove; its antero-lateral boundaries are altogether invisible. The cervical groove is deeply graven posteriorly and is distinct where it cuts the post-orbital crests, but between these two limits is very broad and shallow. Traces also exist of a groove (very distinct in *P. andersonianum*) on the epibranchial region, more or less parallel with the cervical groove. The greater part of the upper surface of the carapace is smooth, but in some specimens fine rugae are visible behind the epigastric and post-orbital crests. The epibranchial regions are strongly tuberculous, the tubercles being fewer, larger and sharper than in the related species. The side-walls bear oblique rugae which extend over the postero-lateral border and are visible from above.

The epigastric and post-orbital crests are similar to those of *P. andersonianum*; the former are obliquely truncate anteriorly and extend forwards in advance of a line joining the posterior borders of the orbits. The post-orbital crests are straight, undermined and irregularly crenulate.

The surface of the front is coarsely granular; its margin, like the upper border of the orbit, is crenulate and in dorsal view is very deeply

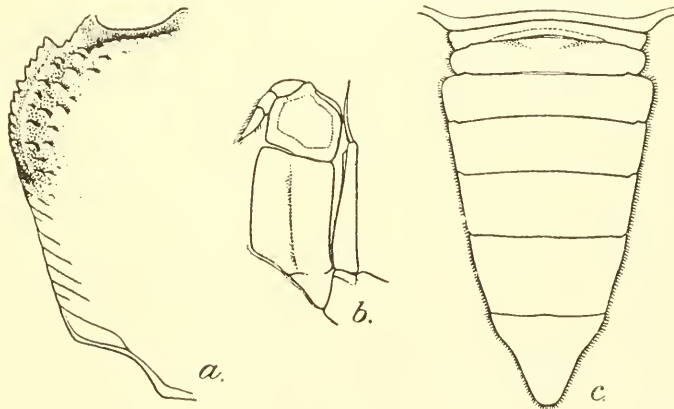


FIG. 1.—*Potamon (Potamon) brownianum*, sp. nov.

- a. Outline of left side of carapace.
- b. Third maxillipede.
- c. Abdomen of male.

bilobed. This last character will at once distinguish it from *P. andersonianum* or any of its varieties. The external orbital tooth is sharp and is separated from the serrate lower border of the orbit by a deep notch.

The antero-lateral border (text-fig. 1a) is sharper and much more strongly reflected upwards than in *P. andersonianum*. It is separated from the coarsely granular epibranchial region by a deep smooth groove and its margin, instead of being serrulate, is spinulose. At the posterior end of the border the spinules are small and closely packed; anteriorly they are larger and more widely spaced; the foremost is a large epibranchial tooth which frequently bears one or more granules on its edges.

The antennular fossae and epistome are much as in the related form. The ischium of the outer maxillipedes (text-fig. 1b) bears the usual groove; the merus is as long as broad and is rounded in outline, rather than irregularly hexagonal as in typical specimens of *P. andersonianum*.

The chelae are more or less of a size. The merus is similar to that of *P. andersonianum*, but the granulation is much crisper, the serrated margin being spinulose and the tooth near the distal end of the inner face becoming a sharp spine with accessory spinules at the base. The carpus is smoother above and is not, or not appreciably, umbilicate. On the upper surface of the palm there are some small and inconspicuous tubercles which extend a little way down the outer face; the lower half of the outer surface is quite smooth. The fingers are more compressed than in the allied species and the teeth on their inner margins are much larger. The dactylus is grooved in the usual way and bears some sharp tubercles at the base of its upper surface.

The walking legs are rather more slender than in *P. andersonianum*, but the anterior margin of the propodus, as in that species, is double-edged. The propodus of the penultimate leg is two and a half times, and that of the last leg twice as long as broad.

In the abdomen of the male (text-fig. 1c) the length of the sixth segment is rather more than half its greatest breadth; the seventh is a little broader than long.

The carapace in six specimens yields the following measurements (in mm.).

Sex	♂	♂	♂	♂	♀	♀
Length	41.8	38.5	36.2	30.5	38.7	33.5
Breadth	52.3	49.3	46.5	38.2	49.2	45.0
Depth	25.3	23.5	21.0	17.7	22.0	18.0

The eggs borne by an ovigerous female are very large, about 3 mm. in diameter.

Palamon brownianum may be distinguished from *P. andersonianum* (i) by its more convex upper surface, (ii) by the incompletely circumscribed mesogastric areola, (iii) by the deeply bilobed front, (iv) by the granulation, which, except on the chelae, is everywhere crisper—particularly on the antero-lateral borders of the carapace, the lower borders of the orbits and the merus of the chelipedes, (v) by the smooth outer surface of the chelae and larger dactylar teeth and (vi) by the more slender propodus of the walking legs. From *P. pealium* (Wood-Mason), which it resembles in the convexity of the upper surface of the carapace, *P. brownianum* is distinguished by the stronger curve and sharper spinulation of the antero-lateral borders, by the more deeply bilobed front and the much less conspicuous frontal eminences.

Dr. Amundale has given me the following notes on the colouration of living specimens of this species. "Dorsal surface dark olive; upper surface of walking legs marbled with a paler shade. Tips of fingers of large claw and of large spine on same appendages white. Frontal and orbital margins reddish brown. Ventral surface of body yellowish white."

The species, which is named after Mr. C. E. Browne, Political Adviser in the Yawngwe State, is apparently not uncommon in the vicinity of the Inlé Lake, but was not found in the lake itself. The specimens are from the He-Ho stream, 3800 ft., from the Hsin Dawng stream, near Yawngwe, 3300 ft., and from the neighbourhood of the Ngot bat cave, 4000 ft. They were found in February and March 1917, under stones at the edge of running water and in holes in the banks of small streams.

The type specimens are from the He-Ho stream and bear the number 9763/10, *Zool. Surv. Ind.*

Potamon (Potamon) acanthicum, sp. nov.

Plate xxiv, figs. 3, 4.

The carapace is short and broad, the length being a little less than three-quarters the greatest depth. The distance in the middle line between the cervical groove and the posterior border is conspicuously less than the distance between the cervical groove and the epigastric crests. The upper surface is strongly convex in both directions, the depth being about half the greatest breadth (pl. xxiv, figs. 3, 4).

The areolation of the carapace is incomplete. The cervical groove is visible only in the posterior part of its course and at the point where it cuts the post-orbital crests; between these limits it is altogether indistinguishable in adults, though sometimes obscurely defined in young specimens. As in *P. brownianum* the antero-lateral boundaries of the mesogastric areola are wanting. In the middle line behind the cervical groove a pair of small lobules are distinguishable and behind these again are faint lateral grooves partially defining a cardiac areola. There is no trace of an epibranchial groove. The surface is for the most part free from any granulation, but is sparsely and coarsely pitted. As a rule a pair of large and shallow pits are conspicuous on either side, placed in a transverse line in front of the posterior portion of the cervical groove. Close to the antero-lateral margin in the vicinity of the epibranchial tooth there is a small number (usually not more than half a dozen) of rather large tubercles. On the side-walls of the carapace there are inconspicuous oblique rugae which pass over the postero-lateral margins and are usually visible from above.

The epigastric and post-orbital crests are well defined and together form a common curve; the former extend rather far forwards and would touch a line joining the posterior limits of the orbits. The edges of the crests are coarsely pitted and have a rugose appearance; they are not undermined. The cervical groove cuts the post-orbital crests at an exceptionally oblique angle. The fissures between the epigastric and post-orbital crests are deep.

The frontal and post-orbital regions are smooth, save for a large and deep pit on the latter behind the cornea of the eye. There are two low eminences on the front which do not conceal the margin when the carapace is viewed from above. The front, in a true dorsal view, is seen to be deeply and widely emarginate in the middle, with the outer angles a trifle produced; it is thus very obscurely quadrilobate. The upper orbital border is smooth; the outer orbital angle is large and rectangular and is separated from the obscurely crenulated lower border by a wide notch.

The antero-lateral border is strongly curved and very much shorter than the postero-lateral, and is characteristic in structure. In the posterior part of its course the border is defined as a ridge bearing serrations which gradually assume the form of spinules from behind forwards. In front of these serrations the margin is not defined as a crest, but its position is indicated by a variable number of very sharp isolated spines, the foremost being the largest. As a rule there are three of these spines, less commonly two or four (text-fig. 2*a, b*); they vary considerably in relative size and position and some of them occasionally bear a subsidiary denticle.

The median tooth on the lower edge of the epistome is rather narrower than usual. The surface of the epistome, together with a small portion of the carapace on the outer side of each efferent branchial opening, bears some coarse hairs. The ischium of the external maxillipedes is grooved as usual and the merus is rounded in outline and as long as broad (text-fig. 2*c*). On both ischium and merus there are some short hairs.

The chelae are unequal in both sexes. The two lower margins of the merus are tubercular and the customary tooth is present on the lower surface near the carpal articulation; on the upper surface there are some transverse rugae. The carpus is very coarsely and irregularly pitted above and there is usually a distinct depression or umbilication near the chela. The inner margin of the upper surface, above the large carpal spine is defined anteriorly by a blunt ridge and posteriorly by a row of four to six tubercles. In old females¹ the larger chela is deep, little more than twice as long as broad in lateral view, the lower border is sinuous, being emarginate at the distal end of the palm, the fixed finger is strongly curved with its lower edge convex and the fingers gape very widely at the base (text-fig. 2*d*). In young examples of both sexes, and in the smaller chelae of large females, the length of the chela is more than two and a half times its breadth, the lower border is nearly straight and the fingers gape but little when the claw is closed. The palm bears some transverse rugae on its upper surface, but is otherwise smooth both within and without, except for scanty pitting. On the outer side of the palm near the upper border there is a longitudinal depression. There are longitudinal rows of pits on the fingers but no distinct grooves. The teeth on the inner margins are conspicuous in small specimens and in the smaller chelae of large individuals. In the larger chelae of well grown examples they tend to become obsolete at the base. The pits on all the segments of the chela are sometimes found

¹ I have not examined any large males.

to contain short stiff bristles, but these are completely worn away in the majority of the specimens.

The second pair of walking legs is a little less than twice the length of the carapace. The propodites show only indistinct traces of the double anterior margin found in *P. andersonianum* and other species; those of the penultimate pair vary from $2\frac{1}{4}$ to about $2\frac{3}{4}$ times as long as broad. The posterior margin of each propodus is armed with from two to four spinules and ends in a sharp spine.

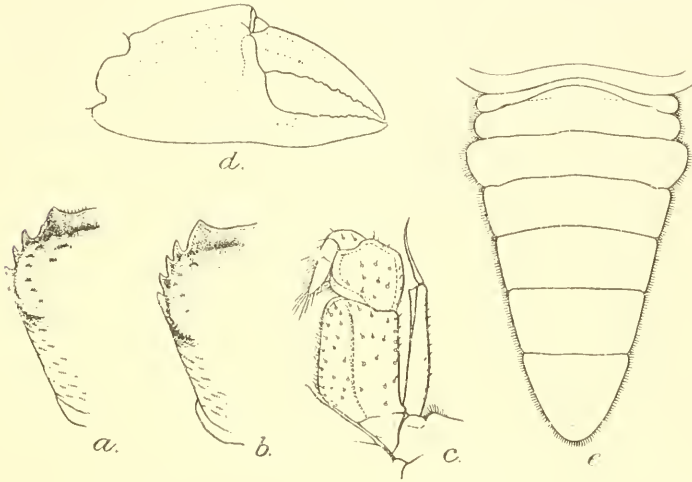


FIG. 2.—*Potamon (Potamon) acanthicum*, sp. nov.

a, b. Outline of left side of carapace.

c. Third maxillipede.

d. Chela of old female.

e. Abdomen of male.

In a male (not perhaps fully adult) the sixth abdominal somite is half as long as broad at the base, while the seventh, which is triangular is a little broader than long (text-fig. 2e).

The measurements (in mm.) of the carapace in eight specimens are as follows:—

Sex	♂	♂	♀	♂	♀	♂	♀	♀
Length	22.7	19.5	25.4	25.0	24.9	23.5	21.7	19.2
Breadth	30.4	26.6	35.5	35.7	34.8	32.3	30.2	25.5
Depth	15.5	13.8	16.7	16.9	16.4	15.5	14.1	12.5

Potamon acanthicum may be distinguished at a glance from all other Indian Potamonidae by the character of the antero-lateral border of the carapace. The sharp isolated spines with which the anterior part of this border is provided appear to be an extreme modification of the serrate or erenulate margin seen in most species of the subgenus *Potamon*; they differ widely in character from the large flat teeth found in Indian species of *Acanthotelpusa*. In *Potamon niloticum*,¹ however, the type species of the subgenus *Acanthotelpusa* (and in a few other species all found in Africa or Madagascar) the teeth are small, conical and irregular.

¹ *Potamon (Paratelpusa) niloticum* (M.-Edw.), Rathbun, *Nour. Arch. Mus. Paris* (4), VII, p. 233, pl. xii, fig. 15 (1905).

much resembling those of *P. acanthicum*, whilst among accepted species of the subgenus *Potamon*, Miss Rathbun's *P. shensiense*,¹ from China, may be cited as an instance of a form in which the crenulations of the antero-lateral margin have become spiniform, though not to the same extent as in the species from the Shan States.

The species seems then, so far as the antero-lateral border of the carapace is concerned, to have undergone modification on the same lines as *P. (Potamon) shensiense* and *P. (Acanthotelpusa) niloticum* and its allies, though it is, in my opinion, clear that it is not closely related to either. Except in the matter of the antero-lateral border *P. shensiense* shows the closest affinity with *P. denticulatum* (Milne-Edwards); it differs widely from *P. acanthicum* in the form of the epigastric and post-orbital crests. In *P. niloticum* the longitudinal groove on the ischium of the third maxillipedes (found in *P. acanthicum* and most Potamonidae) is absent, and there are great differences in the form of the carapace and its areolation.

P. acanthicum must, I think, be regarded as a highly specialized offshoot of the ancestral stock that gave rise to *P. andersonium* and its allies. So far as I can discover no closely related forms are known to exist, and the evidence obtained by Dr. Annandale regarding the other elements of the fauna of the Inlé system points to the conclusion that it evolved in the locality in which it is now found. The development of spines in place of serrations on the antero-lateral border of the carapace appears to have originated independently in *P. acanthicum*, *P. shensiense* and *P. niloticum*, and is thus an instance of convergence.²

The colouration of living specimens of *P. acanthicum* is very striking: Dr. Annandale has kindly supplied me with the following note. "The dorsal surface is black or very dark green, except that the deep groove running across behind the orbits is pale greenish yellow with a blackish margin in front. The upper half of the chelae, including the whole of the movable finger, is densely marbled with pale olive and greenish black; the lower half, including the immovable finger, is pale yellowish. This particoloured character extends to the whole appendage. The articular membrane at the base of the claw is scarlet. The walking legs

¹ Rathbun, *Nouv. Arch. Mus. Paris* (4), VI, p. 262, pl. ix, fig. 8 (1904).

² There is one other point, not perhaps altogether disassociated from a discussion of the affinities of *P. acanthicum*, to which I would like to refer. It concerns the status of *Acanthotelpusa* as defined by Alcock. That the members of this subgenus have been evolved from *Potamon*, *s. s.*, will I think be generally admitted, but I am not convinced that the dividing line between the two subgenera is rightly placed. The characters of *Acanthotelpusa* given by Alcock are two,—"that the antero-lateral borders of the carapace are cut into large teeth or spines, and that the upper border of the merus of the chelipeds bears a subterminal spine." This description is in perfect agreement with the Indian species, but applies less well to *Potamon niloticum*, the type of the subgenus. In the Egyptian species the teeth of the antero-lateral border, as has already been pointed out, are small and irregular in their disposition and the subterminal spine on the upper border of the merus of the chelipeds is, in females at any rate, non-existent. On the other hand the groove on the surface of the ischium of the third maxillipedes is absent in *P. niloticum*, as it is in certain of the Indian species, and this is a rare character in Potamonidae. Judging from the limited material at my disposal I am inclined to think that the Indian species referred by Alcock to *Acanthotelpusa* differ more widely from *P. niloticum* than the latter does from typical species of *Potamon*, *s. s.* If this proves to be the case, *Acanthotelpusa* must once more revert to the synonymy of *Potamon*, while a new subgeneric name will be necessary for the Indian species and their allies. (See Postscriptum, p. 101.)

are dull olivaceous speckled with black. The ventral surface is yellowish and the mouth-parts are stained with dull olive. Individuals from the Inlé Lake are usually more brightly coloured than those from streams in the same district."

This is apparently the only crab that makes its way into the central region of the Inlé Lake, on the bottom of which it is occasionally found. It is more abundant among the roots of the floating islands at the edge of the lake, and also frequents small hill-streams.

The specimens in the collection are from Yawngwe State: from the Inlé Lake, 3000 ft., and from He-Ho stream, 3800 ft. The types, which are from the former locality, bear the number 9771, 10, *Zool. Surv. Ind.*

Potamon (Potamon) curtobates, sp. nov.

Plate xxiv, figs. 5, 6.

This species is allied to *P. abbotti*, Rathbun, *P. inornatum*, Rathbun, and *P. pealianum* (Wood-Mason), but differs from all in the extreme depth and convexity of the carapace.

The length of the carapace is a trifle less than three quarters its greatest breadth; it is thus comparatively short and broad. The depth is always conspicuously more than half the greatest breadth (pl. xxiv, figs. 5, 6).

The cervical groove is well defined posteriorly and the point where it cuts the post-orbital crests is usually clear; in the intermediate part of its course it is exceedingly obscure. The mesogastric areola is remarkably broad, its greatest breadth being almost or quite equal to one-third

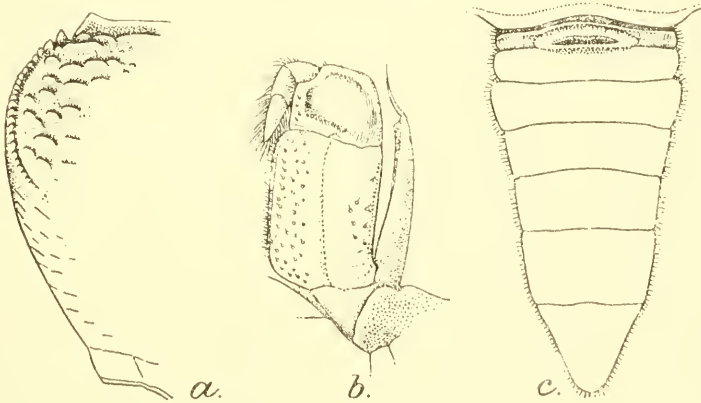


FIG. 3.—*Potamon (potamon) curtobates*, sp. nov.

a. Outline of left side of carapace.

b. Third maxillipede.

c. Abdomen of male.

the breadth of the carapace. (In *P. pealianum* it is only one quarter the breadth.) The antero-lateral boundaries of the areola are usually obsolete in specimens of medium size, but are visible in a very old male. The two small lobules behind the posterior limit of the cervical groove are not as a rule completely defined. The upper surface of the carapace is very strongly convex fore and aft and slightly so from side to side;

it is for the most part smooth and shining with a very fine microscopic granulation. Near the antero-lateral borders it is conspicuously tubercular, the tubercles taking the form of short transverse rugae, rather larger than in *P. pealianum*. In the latter species the sub-branchial regions are not visible in dorsal view beyond the antero-lateral border. In *P. curtobates*, much as in *P. abbotti* and *P. inornatum*, these regions are inflated and are visible from above up to the point where the carapace is broadest. The sub-branchial regions are covered with coarse rugae that extend a short distance over the postero-lateral border.

The epigastric and post-orbital crests together form a common curve. The former are swollen and are rounded in front, without the sharp edge seen in *P. pealianum*. They are almost entirely smooth and extend further forwards than in the allied species, projecting considerably beyond a transverse line joining the posterior limits of the orbits. The post-orbital crests are separated from the epigastric by a conspicuous furrow and are very deep in frontal view; they are obscurely rugose near the cervical groove and beyond this point break up into coarse rugae, the foremost of those on the epibranchial region. The post-orbital crests are situated very close to the orbits, the base of the declivity almost touching the inner corner of the upper orbital margin.

The front is strongly deflexed with a broad and shallow median emargination. The edge itself, as in *P. pealianum*, is concealed in dorsal view by a pair of large post-frontal eminences. These eminences are coarsely pitted and bear fine transverse grooves, they are not, however, tubercular. The median longitudinal furrow that separates the epigastric crests is continued forwards on to the front.

The antero-lateral border of the carapace (text-fig. 3a) is more strongly arched than in *P. pealianum* and is closely serrate throughout with a prominent epibranchial tooth.

Both upper and lower orbital borders are smooth. The external orbital tooth is small but acute and is separated from the lower orbital border by a wide and inconspicuous emargination. The antennular fossae are narrower and more cramped than in *P. pealianum*. The ischium of the external maxillipedes (text-fig. 3b) is grooved in the usual way and is covered with coarse pits bearing stiff hairs. The merus is similarly pitted, especially on its thickened postero-internal margin; it is about as long as broad, narrowed anteriorly and obscurely angled antero-laterally.

The chelipedes are unequal in both sexes. The merus is finely rugose externally and, of its two lower edges, the inner is tuberculate and the outer finely serrate (coarsely tuberculate in *P. pealianum*). In the chelae the lower half of the outer surface of the palm is nearly smooth except for some coarse pitting; the upper surface is strongly rugulose. The dactylus bears a few tubercles on its dorsal surface near the base. The teeth on the inner margins of the fingers are conspicuous. In the larger chela the fingers gape considerably at the base in all the specimens, but not to the extent seen in *P. acanthicum*.

The legs are normal in length, those of the second pair being about twice the length of the carapace. They are rather stout, the propodus of the penultimate leg being about two and-a-quarter times and of the

ultimate leg a little less than twice as long as broad. The anterior and posterior borders of the propodi are rounded, not keeled as in *P. pealianum* and the spinules on the posterior border are very small and inconspicuous.

In the male abdomen the length of the sixth segment is from one-half to two-thirds the basal breadth. The seventh segment is triangular, a little broader than long (text-fig. 3c).

The measurements (in mm.) of the carapace in four specimens are as follows:—

Sex	...	...	♂	♂	♂	♀
Length	...	...	40.5	32.2	28.0	32.5
Breadth	...	...	57.6	44.8	38.4	44.8
Depth	...	...	31.7	26.2	22.2	25.0

I have compared this species with specimens of *P. pealianum* and have pointed out numerous differences in the course of the description given above. *P. abbotti*, Rathbun,¹ and *P. inornatum*, Rathbun,² which I have not seen, appear to be more closely allied, especially the latter.

In *P. abbotti*, which occurs in the Malay Peninsula, the carapace is proportionately narrower than in *P. curtobates*, about four-fifths as long as broad, the post-frontal crest is tuberculate, the median suture is not defined in front of the epigastric lobes, the palms of the chelae are rougher externally, the legs are more slender and the penultimate segment of the abdomen of the male is shorter. *P. inornatum* differs in its narrower carapace, more strongly inflated laterally, in the merus of the external maxillipedes which is more square in outline, and in the much broader terminal segments of the abdomen of the male. Other distinctions will doubtless be found on actual comparison of specimens.

Four specimens of *P. curtobates* are in the collection, obtained for Dr. Annandale by Mr. C. E. Browne. They were found in rice-fields near Yawnghwe. The types bear the number 9775/10, *Zool. Surv. Ind.*

Family PALAEMONIDAE.

Subfamily PALAEMONINAE.

***Palaemon naso*, sp. nov.**

Plate xxv, figs. 1-5.

The rostrum in this species is unusually long, in individuals that are apparently full-grown extending beyond the end of the antennal scale by about one-third of its length (pl. xxv, figs. 1, 2). In specimens between 30 and 40 mm. in length it is proportionately rather shorter, reaching beyond the scale by about one quarter its length. In its proximal half the rostrum is straight, but towards the apex is very strongly reflected upwards: the upper margin is always conspicuously concave in front of the eye. There are, in all, from 8 to 11 dorsal teeth (nearly always 9 or 10)³ and from 5 to 8 ventral teeth (usually

¹ Rathbun, *Proc. Biol. Soc. Washington*, XI, p. 27, pl. 1 (1898).

² Rathbun, *Nouv. Arch. Mus. Paris* (4), VI, p. 311, pl. xiv, fig. 1 (1904).

³ Of fifty specimens four have 8 dorsal teeth, twenty-four have 9, twenty have 10 and two have 11.

5 or 6, very rarely 8).¹ The rostrum begins as a dorsal crest a little in front of the middle point of the carapace. The dorsal teeth are large and in front of each there is a fringe of five setae. The three posterior teeth are, as a rule, situated on the carapace; occasionally the third tooth is placed immediately over the orbit. The posterior teeth are rather widely spaced; the three or four on the basal half of the rostrum proper are a little closer together. Near the apex there are from one to three rather small dorsal teeth, which are sometimes so close to the tip as to give it a bifid or even trifid appearance, and between these and the teeth on the proximal part of the rostrum there is usually one tooth, remote from those before or behind it. On the lower border the teeth are large, with fringes of setae as on the upper margin; they are rather crowded at the base, but more distantly spaced towards the apex. There is no well marked lateral keel on the rostrum.

The carapace is smooth, without trace of roughness or spination. The antennal tooth is situated a little behind the frontal margin. The hepatic tooth is below the level of the antennal; beneath and behind it there is a deep longitudinal depression.

The eye is short and broad; the breadth of the cornea is about one and a half times the dorsal length of the stalk. The ocellus is well marked as usual.

The antennular peduncle is normal in form. The lateral process of the basal segment ends in a tooth that reaches beyond the middle of the second segment. The dorsal lengths of the second and third segments are about equal. The shorter ramus of the outer antennular flagellum is fused basally with its fellow for a distance equal to less than one-fifth of its total length, the fused portion comprising some eight or nine segments. The shorter ramus, viewed from above, is strongly serrate externally. The antennal scale is parallel-sided, with the outer margin nearly straight; it is about three and a half times as long as broad.

The mandibular palp is composed of three segments. The third maxillipedes reach almost to the end of the second segment of the antennular peduncle.

The first peraeopods extend to the end of the antennal scale in specimens of moderate size. In large individuals they are proportionately a little longer, reaching beyond the scale by half or more of the chela. The merus is little more than three-quarters the length of the carpus. The carpus is about two and a half times as long as the chela and the fingers, which bear tufts of setae, are about equal in length with the palm.

The second peraeopods (pl. xxv, fig. 3) are almost or quite equal; they are smooth, slender, and do not differ in the two sexes. They are never more than half the total length of the animal and apparently do not attain the extreme development met with in many species of the genus. In well grown individuals they reach beyond the antennal scale by the chela and sometimes by a small portion of the carpus also, reaching beyond the end of the rostrum by a portion of the finger-length.

¹ Of fifty specimens eighteen have 5 ventral teeth, twenty-six have 6, five have 7 and one has 8.

In examples between 30 and 40 mm. in length they are a little shorter. The proportions of the different segments may be deduced from the measurements given below. The carpus is longer than the merus and the merus than the ischium. The dactylus is a shade shorter than the palm and the entire chela is a little longer than the carpus. The chela is slightly curved and the fingers are without any trace of teeth on their inner margins.

The last three pairs of peraeopods are slender and similar in length, the fifth being slightly the longest. When stretched forwards they all reach beyond the antennular peduncle, but fall short of the apex of the scale. The merus of the third pair is a little more than nine times as long as broad and is about one and a third times the length of the carpus. The propodus is slightly shorter than the merus and is very nearly four times the extreme length of the dactylus. In the fifth pair of legs the propodus is proportionately longer and is about one and a sixth times as long as the merus and seven times the length of the dactylus. The merus is rather less stout than in the third pair and is one fifth longer than the carpus. There are series of spinules on the posterior border of the propodi of all three pairs, but none on the merus. At the distal end of the fifth propodus there is a thick fringe of setae. There are setae also on the dactylus, which is simple, slightly curved and with a large terminal claw (pl. xxv, fig. 4). The branchial formula is the same as that of other species of the genus.¹

The sixth abdominal somite, measured dorsally, is about one and half times the length of the fifth and about two-thirds as long as the telson. The telson bears the usual two pairs of dorso-lateral spinules and ends in a rather broad apex which is produced to an acute point. The innermost of the two pairs of terminal spinules are very long, exceeding the produced apex of the telson by at least two-thirds of their length (pl. xxv, fig. 5).

The appendix masculina is fully developed in specimens less than 35 mm. in length. The largest individual is a male 72 mm. in length. Unfortunately none of the females are ovigerous. Seven specimens yield the following measurements:—

Sex.	Total length.	Length of rostrum and carapace.	Length of carapace.	Length of 2nd peraeopod.	SECOND PERAEPOD: LENGTH OF				
					Ischium.	Merus.	Carpus.	Palm.	Dactylus.
♂	72	36.5	17.8	36	7.2	7.9	9.1	5.2	5.1
♂	67	34.5	16.4	31	5.7	6.7	8.1	4.7	4.3
♂	66	34.2	16.3	32	5.9	6.8	8.2	4.7	4.4
♂	58.5	28.7	13.8	28	5.5	6.3	7.2	4.2	4.1
♂	57	27.4	13.2	26	5.1	5.3	6.2	3.4	3.3
♂	54	25.5	12.5	24	4.8	5.5	6.1	3.3	3.1
♂	33.5	15.8	7.8	15.5	3.0	3.6	4.2	2.3	2.0

¹ As tabulated by Coutière, *Ann. Sci. Nat., Zool.* (8), XII, p. 270 (1891).

In a series of several hundred specimens, which includes many males with the appendix masculina fully developed, the second peraeopods are slender and invariably short, not exceeding half the total length; it may be assumed, I think, that they never attain any greater development. In this respect the species appears to be primitive and resembles such forms as *Palaemon lamarrei*,¹ Milne-Edwards, and *P. lanchesteri*.² de Man. With these it has perhaps some real affinity, but it is readily distinguished from both by the characters of the rostrum and by the proportions of the different segments of the legs. The development of the rostrum is unusual and should probably be taken as evidence of specialization.

The single male, 66 mm. in length, described by de Man from Hollandia in North New Guinea as *Palaemon (Eupalaemon) sp.*³ appears to be closely related to *P. naso*. The rostrum, with 11 teeth above and 5 below, is similar, except that it is not quite so deep in lateral view. The second peraeopods are short: but the proportionate lengths of the different segments are rather different (merus 7.5, carpus 10, palm 4.5, fingers 6.5), the fingers being nearly one and a half times the length of the palm. The fifth legs are much longer, reaching beyond the antennal scale by the dactylus and the distal third of the propodus.⁴

Palaemon multidentis,⁵ Contière, from Madagascar, differs in its shorter rostrum with more numerous dorsal teeth and fewer ventral teeth. The second peraeopods are proportionately much longer and the palm is shorter than the fingers. The fifth legs reach beyond the apex of the rostrum.

De Man's *P. singtangenensis*,⁶ from Borneo, differs widely in the form of the rostrum and the second peraeopods are greatly developed in adults, their length equalling that of the body in males only 57 mm. in length. The segments bear spinules in adults and in their proportionate lengths differ somewhat from those of *P. naso*; there are some small teeth on the inner edges of the fingers.

Dr. Annandale has given me the following note on the colouration of living specimens of *P. naso*. "General colour greyish. Rostrum dark grey. Antennae and antennules reddish. Fingers of chelae tinged with red; a reddish ring on each joint of the large claw-legs. Dorsum of thorax clouded with grey; a small grey spot at each side near the upper limits of the lateral surface on a level with the base of the rostrum. An irregular grey bar sloping backwards and downwards from the lower orbital margin; another, still more irregular and broader, parallel to it a short distance posteriorly; a backwardly directed lunate mark of the same shade about the same distance behind the second bar, and finally a third irregular bar directed straight downwards partly within the lunate mark, a short distance in front of the posterior margin

¹ De Man, *Rec. Ind. Mus.*, II, p. 222, pl. xix, fig. 4 (1908).

² De Man, *Notes Leyden Mus.*, XXXIII, p. 264 (1911); *nom. nov.* for *P. paucidentis*, Lanchester, *Proc. Zool. Soc. London*, 1901, p. 568, pl. xxxiii, fig. 4.

³ De Man, *Zool. Jahrb. Syst.*, p. 427, pl. xxix, figs. 10-12 (1915).

⁴ The word "carpus" in the last line of de Man's description is evidently a misprint for "propodus."

⁵ Contière, *Ann. Sci. Nat. Zool.* (8), XI, p. 327, pl. xiv, figs. 40, 40a (1901).

⁶ De Man, *Notes Leyden Mus.*, XX, p. 138, pl. vi (1898).

of the thorax. A greyish spot on each side of the posterior margin of each abdominal segment and above it a bar of the same colour extending across the dorsal surface. Telson irregularly cross-banded; uropods mottled or clouded."

"The Intha fishermen deny that they are acquainted with any prawns of larger size and state that these are never found in the lake, only in streams and rivers. They say that in cold weather prawns are attracted in large numbers to spots where hot springs flow into the river, but it is uncertain whether their statement refers to this or to the succeeding species."

The larger specimens in the collection, several hundred in number, were obtained alive in the market at Nan-Pan. They were said to have come from Sizon in the Tang-do circle of Yawngwhe State in the river that runs south from the Inlé Lake. A small specimen was obtained in a spring of slightly warm water close to Fort Stedman, within about half a mile of the lake. The types bear the number 9777/10, *Zool. Surv. Ind.*

Palaemon hendersoni, de Man.

1907. *Palaemon* (*Parapalaemon*?) *hendersoni*, de Man, *Trans. Linn. Soc. Zool.* (2), IX, p. 446, pl. xxxiii, figs. 66-68.

1910. *Bithynis* (*Parapalaemon*) *hendersoni*, Rathbun, *Bull. Mus. Comp. Zool., Harvard*, LI, p. 316, pl. v, fig. 3.

1913. *Palaemon hendersoni*, Kemp, *Rec. Ind. Mus.*, VIII, p. 303, pl. xix, figs. 19-23.

Four specimens of this species were obtained by Dr. Annandale in the He-Ho stream, Yawngwhe State, at an altitude of 3800 ft. The largest individual is a full grown male 65 mm. in total length and with carapace 19 mm. in length.

The rostrum is longer than in typical specimens from the Darjiling district, reaching a little beyond the end of the antennular peduncle. It bears from 9 to 11 dorsal teeth, of which 3 (in one case only 2) are on the carapace. There are in each case 3 ventral teeth.

In the large male the longer chelipede of the second pair is about 60 mm. in length, extending beyond the apex of the antennal scale by the chela and one half of the carpus. The ischium is 10 mm. in length, the merus 11 mm., the carpus 9 mm., the palm 16.7 mm. and the fingers 15.4 mm. The carpus is 4.4 mm. broad at the distal end and the palm 6.0 mm. in breadth and 4.9 mm. in thickness. In this individual, as well as in a smaller example only 40 mm. in total length, the fluting of the fingers of the second pereopod is clearly shown.

In the length, number and position of the rostral teeth the Inlé specimens differ slightly from those described by de Man and from those recorded from the Abor country, and examination of series from the Darjiling district, the Abor country, the Garo Hills and the Swa Reserve Forest in Burma seems to indicate that in respect of the rostrum there is a small but constant difference between Burmese specimens and those from Assam and the Eastern Himalayas. I defer further discussion of this point until I have had the opportunity of examining in detail the large accumulation of unnamed Palaemonidae in the Indian Museum.

Palaemon hendersoni is usually of an olivaceous colour in life, with or without darker markings. The colouration of specimens from the Dar-

jiling district is described by Dr. Annandale thus.—“Pale translucent yellowish olive. A dark brown vertical bar on each side of the first abdominal segment and a mid-dorsal streak of the same colour on the first three abdominal segments.” The smaller specimens from the He-Ho stream were “of a uniform dark greyish olive,” but the large male was strikingly different. Dr. Annandale notes that “it was dark blue like a lobster, except for pale bars on the walking legs, pale edges to the outer uropods, pale tips to all the uropods and the telson and the pale fingers of the chelae, the tips of which were reddish. Dr. Annandale’s observations on *P. hendersoni* in the Darjiling district and my own in the Abor country and in the Garo Hills indicate that the deep blue colour seen in this individual does not occur even in the largest males found in Assam and the Eastern Himalayas.

Palaemon sp.

A number of small specimens of *Palaemon* were found among weeds in a small spring of warm water near Fort Stedman, together with numerous examples of *Caridina weberi* prox. var. *sumatrensis* and one young individual of *Palaemon naso*. The specimens, the largest of which is a male 30 mm. in length with the appendix masculina to all appearances fully developed, agree in general appearance with *P. hendersoni*. The rostrum is similar with 9 to 11 teeth above (2 or 3 of which are on the carapace) and with 3, 4 or 5 below. The carpus of the second peraeopods is, however, of much greater proportionate length, being in every instance considerably longer than the palm. In the male 30 mm. in length the second peraeopods are well developed reaching beyond the antennal scale by the chela and a portion of the carpus.

At present our knowledge of the Burmese species of Palaemonidae is very scanty and I am unable to say whether these specimens belong to a small species of *Palaemon*, hitherto undescribed, or whether they represent a dwarfed race of some known form.

Family ATYIDAE.

Caridina annandalei, sp. nov.

Plate xxv, figs. 6-15.

The rostrum usually reaches about to the end of the second segment of the antennular peduncle; in young individuals it is shorter, sometimes extending only to the end of the first segment, while in very large specimens it may reach beyond the middle of the ultimate segment. In lateral view the rostrum is rather strongly depressed, but the tip is frequently a little upturned (fig. 6). On the upper border, which is strongly convex, there are from 11 to 26 teeth (usually 14 to 23)¹; in most instances these teeth stretch uninterruptedly from base to apex, but not

¹ Of one hundred specimens two have 11 dorsal teeth, one has 12, five have 14, seven have 15, eight have 16, fourteen have 17, eleven have 18, fourteen have 19, fifteen have 20, five have 21, six have 22, five have 23, two have 24, two have 25 and three have 26.

infrequently the distal sixth or seventh of the rostrum is unarmed. The teeth in the middle of the series are the most crowded and the posterior 2 to 4 (usually 3) are situated on the carapace behind the orbit. The lower margin of the rostrum bears from 2 to 6 small teeth (usually 2 to 5, very rarely 1),¹ situated in the distal third of its length.

At the lower angle of the orbit there is a narrow projecting lobe, furnished with setae, and immediately below a sharp antennal spine. The antero-inferior angle of the carapace is rounded.

The eyes are normal. The antennular somite is not dorsally carinate. The antennular peduncle (fig. 7) reaches to, or a little beyond the tip of the spine on the antennal scale. The lateral process does not nearly reach the end of the basal segment. The second segment is long and slender; in dorsal view its length is quite two and a half times its basal breadth. The antennal scale (fig. 8) is slender, from three and a half to rather more than four times as long as broad; its outer margin is distinctly concave.

The epipod of the third maxillipedes is short and pointed.

The carpus of the first peraeopods (fig. 9) is from 3.0 to 3.4 times as long as its distal breadth; rarely it is stouter, sometimes only 2.4 times as long as broad. The segment is remarkable for the entire absence of the excavation at the distal end. The second peraeopods (fig. 10) are slender and reach a little beyond the middle of the second segment of the antennular peduncle. The carpus is from $7\frac{1}{2}$ to more than 8 times as long as its distal breadth; the chela is from $4\frac{1}{2}$ to 5 times as long as wide with the fingers from $1\frac{1}{2}$ to $1\frac{1}{2}$ times the length of the palm.

In the third peraeopods which reach about to the end of the antennular peduncle, the propodus is from 2.7 to 3.2 times the length of the dactylus (fig. 11). The latter segment is slender and bears from 8 to 12 spines (fig. 12). The fifth peraeopods are about the same length as the third, but the dactylus is proportionately longer, the propodus being from 2.2 to 2.5 times its length (fig. 13). The spinules on the dactylus vary in number from 44 to 66 (fig. 14) and appear to be least numerous in males.

There are as usual eight branchiae and, in addition, the distal end of the epipod of the second maxillipede is divided into a small number of plumes which doubtless have the function of gills. The epipods on the first two peraeopods are fully formed; that on the third pair is small and rudimentary and that of the fourth pair is entirely absent.

The form of the endopod of the first pleopod of the male is shown in fig. 15.

The telson is a little longer than the sixth somite; its apex is broadly truncate and bears 6, 7 or 8 slender spines between the small spinules at its lateral angles. In addition there are from 3 to 5 pairs of dorso-lateral spinules. The spinules on the outer uropod vary in number from 9 to 13.

The eggs are very large; when freshly extruded they are about 0.9 mm. in length and 0.55 mm. in breadth. When about to hatch

¹ Of one hundred specimens one has only 1 ventral tooth, fourteen have 2 teeth, thirty-one have 3, thirty-two have 4, fifteen have 5 and seven have 6.

they are about 1.0 mm. by 0.6 mm. Oviparous females carry only from 15 to 25 eggs.

Large specimens reach a total length of about 17 mm.

Caridina annandalei is allied to *C. excavata*, Kemp,¹ and *C. hodgarti*, Kemp,² from Assam, the three species differing so far as is known from all other members of the genus in the absence of the epipod at the base of the fourth legs. In other respects also they show signs of close affinity. Classified according to the scheme outlined by Bouvier in 1913³ all three would take a position near *Caridina nilotica*, from which, however, they differ in a number of conspicuous features. In addition to the absence of the epipod on the fourth legs the species resemble each other in their slender build, in the comparatively great proportionate length of the antennular peduncle, in the slightly marked or non-existent excavation at the distal end of the carpus of the first pair of legs and in the possession of large eggs. The species may be distinguished thus:—

- I. Rostrum long, extending at least beyond end of antennular peduncle, the distal part of its upper margin without teeth; 2nd segment of antennular peduncle not more than twice as long as its basal breadth; carpus of 1st peraeopod slightly excavate distally, that of 2nd peraeopod less than 6 times as long as broad; dactylus of 5th leg about one-third the length of propodus.
 - A. Rostrum reaching beyond antennal scale, with a small subterminal tooth on upper border; orbital notch not unusually deeply excavated; antennal scale $4\frac{1}{2}$ times as long as broad; carpus of 1st peraeopods about $1\frac{1}{2}$ times, that of 2nd about 3 times as long as broad; dactylus of 3rd peraeopod with 6 or 7 teeth, that of 5th with about 25 teeth; eggs 0.8 mm. in length *C. hodgarti*.
 - B. Rostrum not reaching beyond antennal scale, without a subterminal dorsal tooth; orbital notch very deeply excavated; antennal scale about 3 times as long as broad; carpus of 1st peraeopod about 3 times, that of 2nd about $5\frac{1}{2}$ times as long as broad; dactylus of 3rd peraeopod with 8-10 teeth, that of 5th with 40-50 teeth; eggs about 1 mm. in length *C. excavata*.
- II. Rostrum short, not reaching end of antennular peduncle, with teeth throughout the length of its upper border; 2nd segment of antennular peduncle $2\frac{1}{2}$ times as long as its basal breadth; carpus of 1st peraeopod not excavate distally, 3 to $3\frac{1}{2}$ times as long as broad, that of 2nd more than 7 times as long as broad; dactylus of 5th leg less than one third the length of propodus. [Antennal scale 3 to $3\frac{1}{2}$ times as long as broad; dactylus of 3rd peraeopod with 8-12 teeth, that of 5th peraeopod with 44-66 teeth; eggs 0.9-1.0 mm. in length] *C. annandalei*.

Caridina annandalei is very abundant among green weeds in all parts of the Inlé Lake⁴ and is also common in flooded rice-fields and waterways in the Yawngwhe plain. In these localities it occurs at an altitude of 3000 ft. It was also found, though less plentifully in the

¹ Kemp, *Rec. Ind. Mus.*, VII, p. 306, pl. xx, figs. 32-35, pl. xxi, figs. 36, 37 (1913).

² Kemp, *ibid.*, p. 309, pl. xx, figs. 29-31, pl. xxi, figs. 38, 39 (1913).

³ Bouvier, *Trans. Linn. Soc. (2), Zool.*, XV, p. 462 (1913).

⁴ Oviparous females were found only in the lake.

He-Ho river, at 3800 ft., among the roots of trees and under floating leaves and twigs.

Dr. Annandale has supplied me with the following notes on the colouration of living specimens.—“Individuals from the open part of the lake were translucent but speckled more or less densely with dark olive green and shining white. On the sides of the thorax the dark specks tended to congregate in three broad vertical bars, but in this respect the colouration was variable. In darker individuals somewhat indefinite cross bars could also be detected on the posterior margin of each abdominal segment. Individuals from the black water of the He-Ho river were speckled with black or very dark purple, and had no white specks. There was a slanting dark bar a little behind the middle of the thorax and usually another, less distinct, in front of it. There was also an irregular dark mark near the posterior margin of the carapace. A dark spot was always present at the base of each pleopod and there was sometimes a round dark spot at each side of each abdominal segment near the dorsal surface.

The aberrant Trematode *Caridinicola* is usually to be found in the gill-chambers of individuals from the lake, and the Protozoon *Colthurnia* is abundant on their uropods and other appendages.”

In addition to the specimens from the Shan plateau, there are in the Indian Museum five specimens (two of which are ovigerous) obtained by Wood-Mason from “Upper Tenasserim,” and two (one of which is ovigerous) found by Dr. Annandale in a swampy lake at Kawkareik, in level country in the interior of the Amherst district, Tenasserim, in March, 1908.

The types, which are from the Inlé Lake, bear the number 9783/10, *Zool. Surv. Ind.*

Caridina weberi, de Man.

1892. *Caridina weberi*, de Man, in *Weber's Zool. Ergebn. Reise Nied. Ost-Ind.* II, p. 371, pl. xxii, fig. 23.

prox. var. *sumatrensis*, de Man.

1892. *Caridina weberi* var. *sumatrensis*, de Man, *ibid.*, p. 375, pl. xxii, fig. 23g.

The commonest *Caridina* of the plains of India and Burma is a form allied to de Man's *C. weberi* var. *sumatrensis*. A cursory examination of the Museum collection, which contains samples from many widely distant localities, shows that there are in India a great number of local races, some of which will probably be found to deserve recognition in nomenclature. I will therefore in this account of the Inlé Decapoda content myself with a few remarks on the characteristics of the Shan race and on the features in which it differs from that found in Sumatra. The differences, though considerable, do not appear to be specific.

The rostrum reaches to the middle or end of the second segment of the antennular peduncle. Its straight or slightly convex upper border bears from 12 to 20 teeth (usually 13 to 18),¹ distributed throughout its length, and of these, 3 or 4 (rarely 2) are placed on the carapace

¹ Of one hundred specimens three have 12 dorsal teeth, ten have 13, seventeen have 14, thirty-seven have 15, fifteen have 16, eleven have 17, six have 18 and one has 20.

behind the orbit. The lower border bears from 0 to 5 teeth (usually 1 to 3).¹

The antero-lateral angle of the carapace is produced and forms a small tooth. This character is apparently not found in typical *C. weberi*, nor (according to specimens from Deli in Sumatra, preserved in the Indian Museum) in typical var. *sumatrensis*. The character is an unusual one in *Caridina* and in some species (*C. denticulata*, de Haan, for instance) appears to be of considerable specific importance. In the specimens from the Shan States the tooth is invariably present, but in samples of very closely related forms from other parts of India it is inconstant in its development.² For the present, at least, I am not able to regard the character as having specific value in the *C. weberi* group.

The second segment of the antennular peduncle is short and stout, intermediate in form between de Man's figs. 23 and 23j (*loc. cit.*). The antennal scale is about two and three-quarter times as long as broad.

The carpus of the first pair of peraeopods is deeply excavate and from 1.6 to 1.75 times as long as broad; that of the second pair is from 4.5 to 5.5 times as long as broad. The fingers in the second pair are scarcely one and a half times as long as the palm. The propodus of the third peraeopods is from 3.2 to 3.8 times as long as the dactylus (rarely shorter: 2.8 times), the latter segment bearing 6 or 7 teeth. In the fifth peraeopods the propodus is from 2.9 to 3.2 times the length of the dactylus, the dactylus bearing from 27 to 33 spinules.

There are from 13 to 18 movable spines on the outer uropod.

Exceptionally large specimens reach a length of 19 mm.; the majority of those in the collection are smaller, not exceeding 15 mm. The eggs are very large, about 1.1 mm. by 0.7 mm. in longer and shorter diameter. Oviparous females carry very few eggs, the numbers in two instances in which they were removed and counted being 19 and 26.

This form differs from *C. weberi* var. *sumatrensis* in a number of particulars which are apparently of subspecific importance: (i) both dorsal and ventral teeth of the rostrum are rather less numerous, (ii) the antero-inferior angle of the carapace is toothed, (iii) the fingers of the second peraeopod are proportionately shorter in relation to the palm and the propodus of the third peraeopod shorter in relation to the dactylus and (iv) the eggs are very much larger.

Dr. Annandale found a number of specimens in small streams running into the Hulé Lake at an altitude of 3000 ft., and in those on the He-Ho plain at 3860 ft. It was occasionally found in the lake itself, near the edge, but never in the central region.

The colouration of living specimens is described by Dr. Annandale as follows:—“In individuals from among green weeds in a small stream

¹ Of one hundred specimens two have no ventral teeth, twenty-four have 1 tooth, forty-three have 2 teeth, twenty-three have 3, six have 4 and two have 5.

² Thus in a hundred specimens of a form closely allied to that obtained by Dr. Annandale, found at Tinnevely in South India, the antero-lateral angle bears an acute tooth in 18 per cent. of the specimens, is rectangular or obtusely angled in 19 per cent. and is rounded in 63 per cent. This form is intermediate between typical var. *sumatrensis* and the Shan race in the size of the eggs, which are 0.7 mm. in length and 0.45 mm. in breadth.

near Fort Stedman the whole of the body was more or less darkened with green chromatophores and was sometimes almost black. A pale mid-dorsal line was usually present, and sometimes white specks could be detected on the thorax, abdomen and telson. In paler individuals there was a small dark spot at the base of each pleopod. The fingers of the chelae were darkened, but the bunch of hairs at the tip was often white. Individuals from the He-Ho stream, the water of which has a peculiar blackish colour owing to the large amount of fragments of carbonized vegetation it contains, were rather dark but had three parallel colourless bars slanting along each side of the carapace. There was a pale cross-bar on each abdominal segment and a colourless mid-dorsal line."

POSTSCRIPTUM.

Acanthopotamon,

nom. nov. for *Acanthotelphusa* Alcock *nee* Ortman.

While this paper was still in the press Calman published an account of *Potamon* (*Potamonantes*) *warreni*,¹ a new river crab from the Transvaal. The affinities of this species, which are discussed by Calman, throw much light on the position of *Acanthotelphusa*.

P. (Potamonantes) warreni has an extremely close affinity with the common South African *P. (P.) perlatum*, differing from that species only in the fact that the granules of the antero-lateral margin are replaced by spiniform teeth. The species thus affords, in the subgenus *Potamonantes*, an instance of evolution exactly parallel to that which I believe to have occurred on at least two independent occasions in the subgenus *Potamon*, *viz.* in *P. (P.) shensiense* and *P. (P.) acanthicum* (see p. 85).

As Calman has remarked *P. (Potamonantes) warreni* on any of the current schemes of classification would be separated generically or subgenerically from *P. (P.) perlatum*. Were it not for the proofs of its affinity that Calman has brought forward, it is almost certain that it would have been referred to *Acanthotelphusa*, for it closely resembles *P. (Acanthotelphusa) niloticum* in the character of the antero-lateral margin.

There is, as Calman has hinted, reason for the belief that *P. niloticum* has originated, in much the same way as *P. warreni*, from some East African species with normally constituted antero-lateral border. But, however this may be, it is clear that its affinities are not with the well-defined group of Asiatic species to which Alcock has applied the name *Acanthotelphusa*. Since *P. niloticum* is the type of the latter subgenus, it is evident that a new name is necessary for the Asiatic forms. I suggest *Acanthopotamon*, distinguished from *Potamon s.s.* by two characters,—the antero-lateral borders of the carapace are cut into three or four large teeth,² and (ii) the upper border of the merus of the chelipedes bears a sub-terminal spine.

¹ Calman, *Ann. Mag. Nat. Hist.* (9), 4, p. 234 (1918).

² Exclusive of the external orbital tooth.

Type.—*Potamon martensi* (Wood-Mason).¹

The species of this subgenus bear a close general resemblance to those of *Paratelphusa s.s.*, but are distinguished by the different form of the mandibular palp. In Miss Rathbun's monograph ² *Paratelphusa* is regarded as a subgenus of *Potamon* and comprises species belonging both to *Paratelphusa s.s.*, as defined by Alcock and to *Acanthopotamon*. It also includes *P. niloticum* and two allied forms, which are perhaps derivatives of *Potamonantes*, and *P. antonylensis* which appears to have been evolved from *Geotelphusa*.

¹ *Potamon (Acanthotelphusa) martensi*, Alcock, *Cat. Indian Decap. Crust., Potamonidae*, p. 68, fig. 52 (1910).

² Rathbun, *Nouv. Arch. Mus. Paris* (4) VII, p. 228 (1905).

EXPLANATION OF PLATE XXIV.

Potamon (Potamon) brownianum, sp. nov.

Figs. 1, 2.—Dorsal and frontal views of a male 52·3 mm. in breadth.

Potamon (Potamon) acanthicum, sp. nov.

Figs. 3, 4.—Dorsal and frontal views of a female 32·3 mm. in breadth.

Potamon (Potamon) curtobates, sp. nov.

Figs. 5, 6.—Dorsal and frontal views of a male 44·8 mm. in breadth.



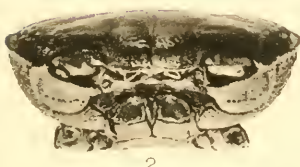
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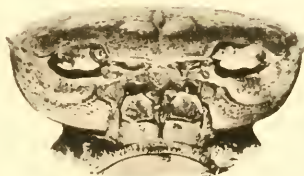
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6

Callinectes sapidus

Callinectes sapidus (Linnaeus)

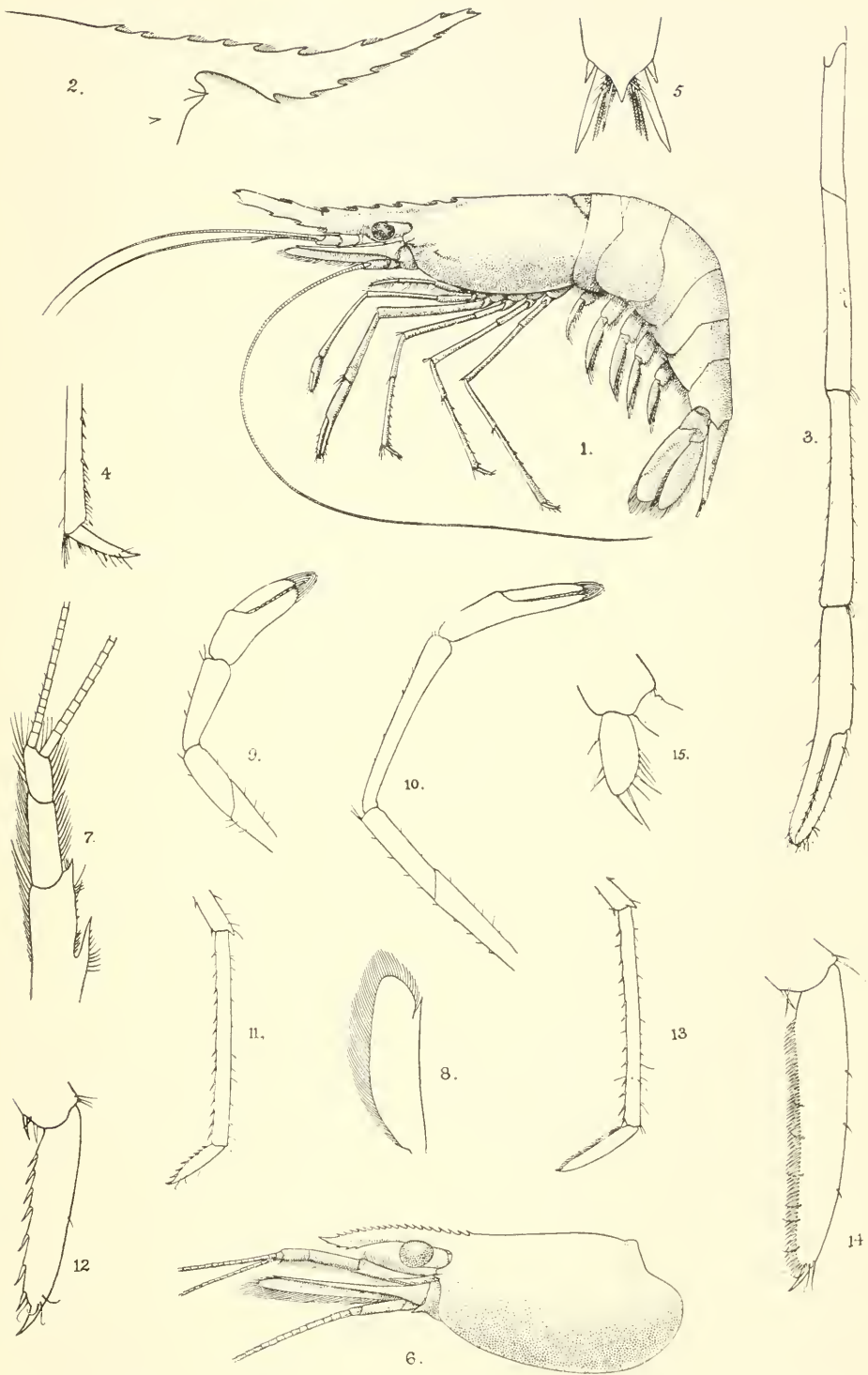
EXPLANATION OF PLATE XXV.

Palaemon naso, sp. nov.

- Fig. 1.—Lateral view of an adult male, enlarged.
,, 2.—Rostrum of another specimen.
,, 3.—Second peraeopod.
,, 4.—End of propodus and dactylus of third peraeopod.
,, 5.—Apex of telson.

Caridina annandalei, sp. nov.

- Fig. 6.—Carapace, rostrum, etc., in lateral view, enlarged.
,, 7.—Antennule in dorsal view.
,, 8.—Antennal scale.
,, 9.—First peraeopod.
,, 10.—Second peraeopod.
,, 11.—Propodus and dactylus of third peraeopod.
,, 12.—Dactylus of third peraeopod, further enlarged.
,, 13.—Propodus and dactylus of fifth peraeopod.
,, 14.—Dactylus of fifth peraeopod, further enlarged.
,, 15.—Endopod of first pleopod of male.



A. C. Chowdhary del.

DECAPODA FROM THE S. SHAN STATES.